

# CANCER INQUIRY REPORT

CAMERON  
AREA  
BENIGN

Margaret Donnelly, Director  
Missouri Department of Health and Senior Services

# **Cameron Benign and Malignant Brain Tumor Investigation**

## **Final Report Summary**

### **Background**

The Cameron Benign and Malignant Brain Tumor Investigation began on April 11, 2008, when a Cameron resident contacted the Missouri Department of Health and Senior Services to express concern over the number of benign brain tumors occurring in the Cameron area. The investigation – known as a Cancer Inquiry – was soon expanded to include both cancerous and non-cancerous brain tumors.

The investigation began with a search for relevant medical and other types of information on cancerous and non-cancerous brain tumors diagnosed among residents from any of the four counties in the Cameron zip code – DeKalb, Daviess, Clinton, and Caldwell. Information was gathered from cancer case information collected by the Missouri Cancer Registry (MCR) and from death certificates.

Forms were also made available to area residents for submitting patient information. A total of 99 forms were submitted by patients diagnosed with brain tumors or their representatives. All forms were cross-checked with the MCR to confirm diagnoses and to prevent duplication. When possible, follow-up telephone calls were made to gather missing information from hospitals, physician's offices and some patients and families.

### **Investigation Findings and Conclusions**

- There were 78 people meeting the case definition used to determine which cases would be included in this inquiry.
- Among those included in this investigation, 49 people were diagnosed with primary cancerous tumors from 1996 through 2008. This number is lower than, but not significantly different from, the 53.7 cases that would normally be expected based on the state's average number of diagnosed primary cancerous brain tumors.
- From 2004 to 2008, 29 people from the four-county area were diagnosed with primary non-cancerous growths or unclassified tumors. Again, this number is lower than, but not significantly different from, the 33.5 cases that would normally be expected based on the average number of diagnosed non-cancerous brain tumors found throughout Missouri.
- There is no statistically significant increase in deaths due to brain tumors – non-cancerous or cancerous – in these communities compared with the state of Missouri.
- No clustering of brain tumor cases or deaths related to brain tumors is evident in the Cameron area compared with the state of Missouri.

- Primary brain tumor rates in the Cameron area, as well as in the entire state, are actually lower than brain tumor rates in the United States.
- Extensive environmental sampling in the area has not revealed an environmental factor that could be considered a cause for brain tumor development in the four-county area under study.
- The extended follow-up period, which included data submitted to the MCR and CDC in December 2009, identified eight more cases of non-cancerous or cancerous brain tumors. However, these additional reports did not change the investigation's results; the rates of disease or death for the Cameron area remained similar to statewide rates.

### **Brain Tumors and Other Cancers Compared**

To help address how common non-cancerous and cancerous brain tumors are in the Cameron area compared with the entire state of Missouri, MCR data were reviewed to rank the ten most common types of cancer reported in the Cameron area. These were then compared to the ten most common types of cancer reported in Missouri. Because benign brain tumors were included and compared to statewide data, the chart reflects data from the years 2004 through 2008.

The data showed that brain tumors were actually more common in Missouri as a whole than they were in the four counties around Cameron.

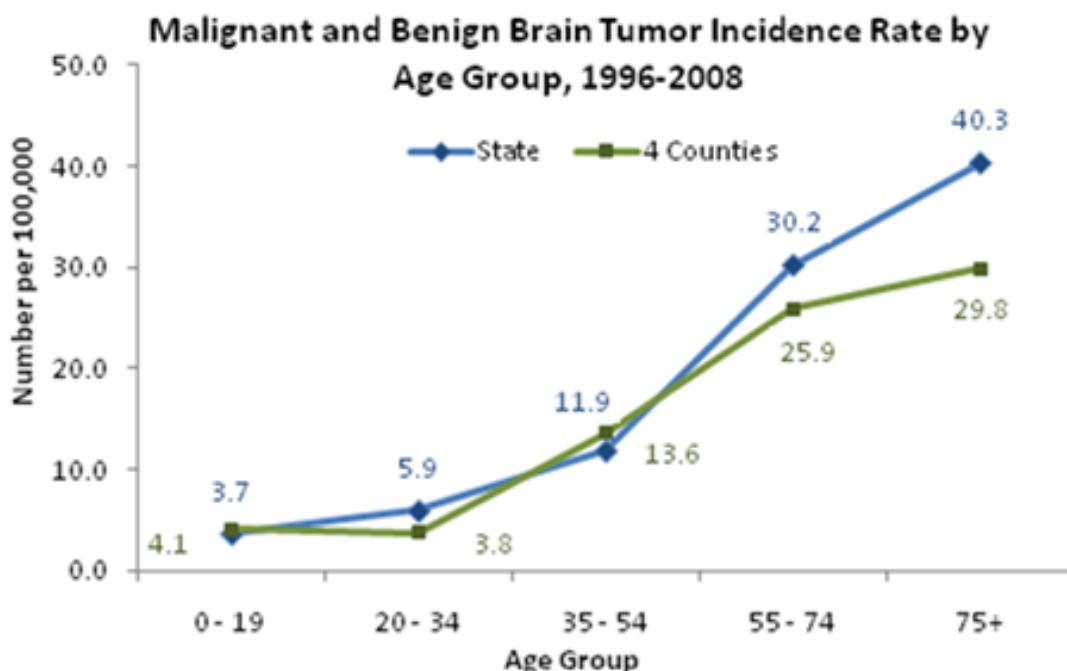
#### **Cameron 4-County Area**

1. Lung and Bronchus (17.3%)
2. Prostate (13.6%)
3. Colon and Rectum (12.6%)
4. Female Breast (11.6%)
5. Urinary Bladder (4.4%)
6. Kidney and Renal Pelvis (4.4%)
7. Non-Hodgkin Lymphoma (4.0%)
8. Corpus and Uterus, NOS (3.4%)
- 9. Benign and malignant brain (3.1%)**
10. Melanoma of the Skin (2.9%)

#### **Missouri**

1. Lung and Bronchus (17.1%)
2. Female Breast (14.0%)
3. Prostate (12.8%)
4. Colon and Rectum (10.9%)
5. Urinary Bladder (4.3%)
- 6. Benign and malignant brain (4.2%)**
7. Non-Hodgkin Lymphoma (4.0%)
8. Kidney and Renal Pelvis (3.7%)
9. Melanoma of the Skin (3.6%)
10. Corpus and Uterus, NOS (2.9%)

## Cancer Rates Among Various Age Groups



Data source: Missouri Cancer Registry

The frequency of malignant and benign brain tumors varies among different age groups, but generally increases with age. No significant differences were found between the brain tumor rates in the four-county Cameron area and the rates for Missouri as a whole.

The brain tumor rates in the four-county Cameron area were similar to, though slightly lower than, the statewide rates with two exceptions. The four-county Cameron rate showed a slightly higher-than-expected number in the birth-to-19 age group. However, the higher reading was based on a very small number of tumors, which can result in an overstated rate. Among the 75-and-older population, residents of the four-county Cameron area had a significantly lower brain tumor rate than among the same age group statewide.

In general, if tumors were caused by exposure to something in the environment, a stable population whose members had lived continuously in the area would be expected to experience more tumors as they age and the years of exposure to the environmental hazard increased. In the four-county Cameron area, brain tumor rates among people 55 to 74 years old were slightly lower than statewide rates, and rates among people 75 and older were significantly lower in the Cameron area.

## About Case Definitions

When conducting this cancer inquiry, researchers looked for four things to determine whether the area had an elevated number of brain tumors:

- (1) increased number of cases or deaths caused by non-cancerous or cancerous tumors of the brain or central nervous system (CNS);
- (2) grouping of cases in one age group;
- (3) an unexpected or unexplained mix of cases of the different brain cancer subtypes; and,
- (4) an increase in other cancers that may be related to environmental sources.

When studying how a disease affects a given population, researchers develop a **case definition** to help them in their work. A case definition is a set of standard criteria used to decide whether an individual has the health condition being investigated and should be included in the study. For this inquiry, and in response to community input, DHSS developed the following case definition:

### **For primary cancerous brain and CNS tumors diagnosed between January 1, 1996 through December 31, 2009:**

- Residence in Caldwell, Clinton, Daviess, or Dekalb County (the counties with part of the Cameron zip code included in them) at the time of physician diagnosis of a malignant brain or central nervous system tumor.
- Data from the Missouri Cancer Registry used for 1996-2007 has now been externally verified through the Centers for Disease Control and Prevention as 95% or more complete. Data from 2008 are projected as 90% complete. Data through 2009 were obtained only through early reports to the MCR and by self-reports from patients or those who know them via the Patient Information Forms. Therefore, the 2008-2009 data have not gone through the same rigorous validation process and should be considered provisional at best.
- Mortality data arise from death certificate submission to the DHSS Bureau of Vital Records and cover the same four-county area for the time period of 1999-2008.
- All data included were received by February 24, 2010.

### **For non-cancerous brain and CNS tumors diagnosed between January 1, 2004 through December 31, 2009:**

- Residence in Caldwell, Clinton, Daviess, or Dekalb County (the counties with part of the Cameron zip code included in them) at the time of physician diagnosis of a benign brain or central nervous system tumor.
- Data from the Missouri Cancer Registry (MCR) used for 2004-2007 has been externally verified through the CDC as 95% or more complete, whereas case data from 2008 are projected as 90% complete. Data from 2009 were obtained only through early reports to the MCR and by self-reports from patients or those who know them via the Patient Information Forms, thus the 2008-2009 data have not gone through the same rigorous validation process and should be considered provisional at best.

- Mortality data arise from death certificate submission to the DHSS Bureau of Vital Records and cover the same four-county area for the time period of 1999-2008.
- All data included were received by February 24, 2010.

## Quality Control Measures

To ensure that nothing was missed that could strengthen the investigation, a special process was conducted specifically for this inquiry through which the MCR requested that all Missouri hospital-based tumor registries and other reporting entities report to the registry ahead of schedule any tumors that meet this investigation's case definition. The same request was made to central registries in other states and to referral hospitals frequently used by Missouri residents. Cancer registries from as far away as Texas responded to this request to assist Missouri in identifying potential Cameron area cases of benign and malignant brain tumors.

Further, University of Missouri-Columbia was contracted to do a special, in-depth statewide study of reported diseases to see if any clusters of brain tumors could be identified in the Cameron area. Using the most current, accurate information available, researchers entered case details into mapping programs to create pictures showing possible connections between disease cases by location and/or in time.

As part of quality improvement processes, MCR was audited in 2008 by the CDC's contractor, Macro International. The audit was conducted on diagnoses reported in 2005. The completeness rate was 96.7%. MCR was specifically mentioned as having no missed benign brain tumor cases. The Missouri Cancer Registry has also been acknowledged by the North American Association of Central Cancer Registries (NACCR) as being of the highest standard ('gold-certified') level designation in both 2008 and 2009.

## For More Information

- **Bureau of Cancer and Chronic Disease Control**  
Missouri Department of Health and Senior Services  
PO Box 570, Jefferson City, MO 65102-0570  
Telephone: 573-522-2845  
Fax: 573-522-2899  
Email: [info@dhss.mo.gov](mailto:info@dhss.mo.gov)
- Cameron Brain Tumor Investigation [www.dhss.mo.gov/CancerInquiry/CBCI.html](http://www.dhss.mo.gov/CancerInquiry/CBCI.html)
- Missouri Cancer Registry [www.cbtrus.org](http://www.cbtrus.org)

Alternate forms of this publication for persons with disabilities may be obtained by contacting the Missouri Department of Health and Senior Services' Office of Epidemiology at 573-751-6128. Hearing- and speech-impaired citizens can dial 711.

AN EQUAL OPPORTUNITY/AFFIRMATIVE ACTION EMPLOYER  
Services provided on a nondiscriminatory basis.